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ABOUT A NEW FUNGUS-EATING MORDELLID-BEETLE FROM ECUADOR

(COL. MORDELLIDAE) (1)

Father Giovanni Onore, a missionaire now in Quito, who formerly had collected in West Africa, is successfully continuing his collecting activity in Ecuador where he relocated.

I am indebted to Mr. Sergio Riese for having submitted for study two specimens of Mordellidae, collected in rather unusual circumstances, sorted by him from the material periodically sent by Father Onore.

Boatia n. gen.

Type species: *Boatia albertae* n. sp. (subfamily Mordellinae, tribe Mordellini).

Diagnosis. Form anaspoid (plate I), reminding that of *Cothurus* Champion 1891: 259, *Larinomorda* Ermisch 1968: 263, *Phungia* Pic 1922: 17 and, to a minor extent, of *Dollmania* Francisc. 1961: 15. Head normally convex, with no setigerous frontal pit; occipital margin regularly convex without medial protuberance or pit. Eyes neither emarginate nor hypocranially expanded, sparsely and shortly pubescent, very finely faceted (each cornea 0.014 mm in diameter: type G, Franciscolo 1962: 108). Antennae (♂) not flabellate, articles 5-9 longer than 4 with last article emarginate at its inner distal part (fig. 12). Maxillary palpi (♂) of type B, fig. 8 (Franciscolo 1957: 216). Labial palpi (♂) as in fig. 11. Galeae much shorter than one half of head, much longer and broader than laciniae, strongly spatulate (fig. 6). Paraglossae strongly expanded and spatulate (fig. 7). Hind margin of pronotum with me-

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(1) 52nd contribution to the knowledge of Mordellidae.

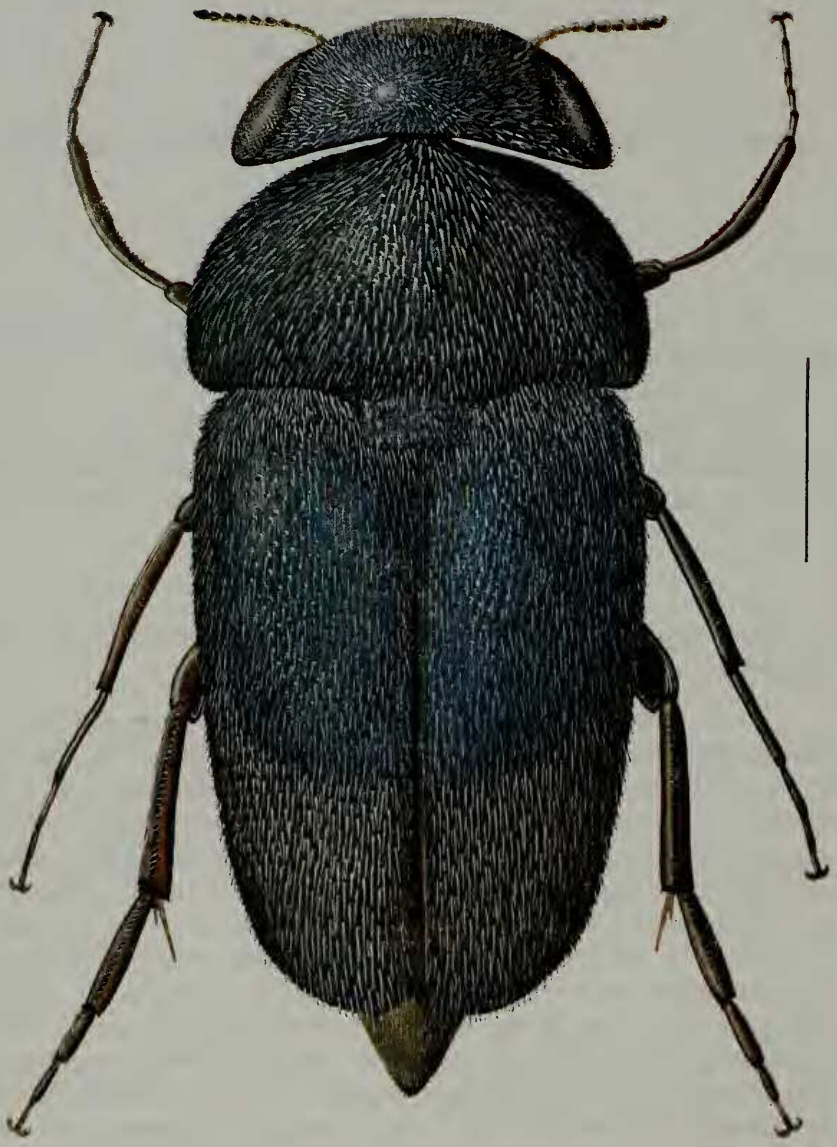

Plate I - *Boatia albertae* n. gen., n. sp., ♂ holotype. Scale = 1 mm.

dian lobe broad, protruding, emarginate (plate I). Scutellum exactly rectangular (fig. 16). Mesocoxal cavities strongly separated from one another; the anterior edge of metasternum is elevate, to build a transverse keel which delimits a deep and concave area in the mesosternal and mesepimeral region (fig. 1-2). Metepisterna and elytral epipleurae as in fig. 2. Elytra totally concealing abdominal terga, except pygidium, separately rounded at apex (plate I). Hind wings fully developed. Metatrocanthers and metacoxal process as in fig. 1. Anterior tibiae and femora with densely arranged, short and robust spines at their inner side; anterior and median tarsi with 4th article as broad as 3rd, linear, distally straightly cut (fig. 3-4 and 14). Medial tibiae slightly shorter than medial tarsi. Hind tibiae with a normal preapical ridge entirely parallel to the apical margin and with a dorso-lateral ridge all along their outer side; hind tibial spurs pubescent, obconical, well developed and not serrate (fig. 13); hind basitarsus with a similarly developed dorsal ridge (fig. 13). All claws strongly dentate, basipulvilla long and spinulate (fig. 15). Pygidium almost as long as broad, of the *Xanthoconalia* type (Franciscolo 1943: 293). Paramera strongly asymmetrical, of type C (Franciscolo 1957: 225), fig. 17-20. 8th internal urosternum of the *Mordella* type (ibid.: 222).

Affinities. *Boatia* shares with *Cothurus* a highly specialized and cladistically apotypic character: the transverse mesosterno-metasternal keel as first noted by Champion 1891: 259-260 (all subsequent authors, including myself, have given no importance to Champion's description), the general layout of body and the strong iridescence of notal surfaces (which is known only for *Larinomorda* and for *Mordella viridipennis* Mulsant) as well as the strongly separated mesocoxal cavities. The examination of two syntypes (♂ and ♀) of *Cothurus iridescens* Champion l.c. 260 kindly submitted by Mr. R.D. Pope, British Museum (N. H.) has shown that Champion was correct in stating that the « sharply transversely keeled metasternum in front, immediately behind the widely separated middle coxae, its anterior edge vertical, the keel extending outwards as far as the coxae » (in reality it extends till the edge of metepisterna) is the most outstanding character of *Cothurus*, neatly « differing as it does from all other members of the group Mordellidae ». Hence the position of *Cothurus* was wrongly placed at the beginning of the key of world genera both by Ermisch (1950: 39) and myself (Franciscolo 1965: 344); *Boatia*, by means of several repetitive, partly plesiotypic and

partly apotypic characters, appears related to *Cothurus*, and I suggest that my key to world genera in l.c. be modified as follows, adding A (B) before item 1 (2):

A (B) No transverse mesosterno-metasternal carina; mesosternal

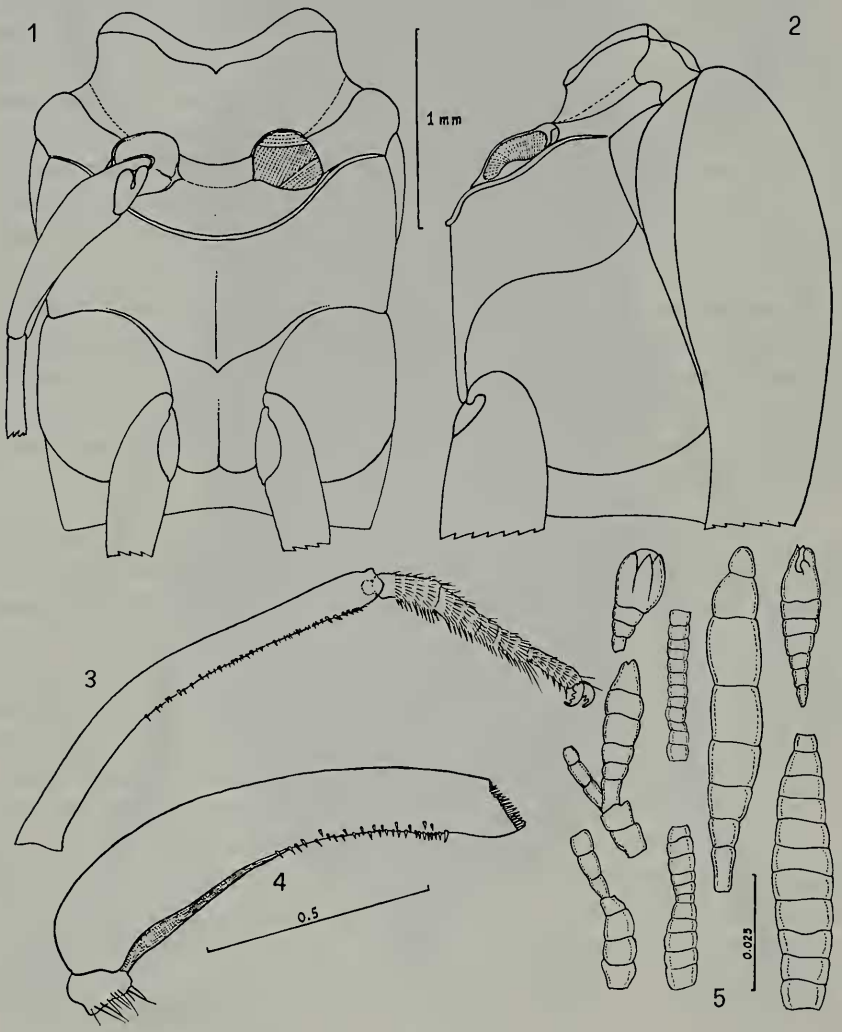

Fig. 1-5 - *Boatia albertae*, ♂ holotype: 1. meso- and metasternum, ventrally; 2. same, laterally from left; 3. protibia and protarsus; 4. profemor; 5. some samples of teleutospores of Uredinales filling the proctodeal vessel.

area between mesocoxal cavities much narrower than the diameter of each mesocoxa.

1 (2) - 54 (53): the key remains unchanged, with the exception of *Cothurus*, to be moved in item B (A) below:

B (A) A strongly developed, transverse, elevated mesosterno-metasternal carina running from the lower angle of one metepisternum to that of the other (fig. 1-2); mesosternal area between mesocoxal cavities broader or much broader than the diameter of each mesocoxa.

55 (56) Anterior tarsal articles of increasing width from 1 to 4; 4th article distally narrowly and deeply emarginate, not bilobed, hardly longer than 3rd. Galea moderately expanded, distally less than three times broader than lacinia. Maxillary palpi of the *Glipa* type, flat, triangular, with the longest side frontally. Last antennal article complete. Hind tibiae only with a neat dorso-lateral ridge (revision of genus in preparation) ..... *Cothurus* Champ. 1891 Mexico (Cordova); Venezuela, Estado Miranda (another species to be described).

56 (55) Anterior tarsal articles of decreasing width from 1 to 5, the 4th article much longer than 3rd, straightly cut distally (fig. 14). Galea very broadly spatulate (fig. 6), 3.5 times broader distally than lacinia. Maxillary palpi of ♂ stout, subsecuriform, outer side longer than the inner and the anterior one (fig. 8). Last antennal article of antennae deeply emarginate at its inner side, like in *Tomoxia* Costa 1854: 8 (as redefined in FRANCISCOLO 1982: 55), fig. 12. Hind tibiae and hind basitarsus with a neat dorso-lateral ridge, fig. 13 (again like in *Tomoxia*) ..... *Boatia* n. gen. Ecuador (Rio Coca); monobasic.

Boatia albertae n. sp.

Material examined: 1 ♂ holotype, beaten on crown of a very tall tree immediately after felling by bulldozers, in moist evergreen forest at 1000 m.a.s. in Rio Coca region near Puerto Orellana, north of Rio Napo, Prov. de Napo, Ecuador, South America, January 1982, leg. G. Onore (MSNG, Genova).

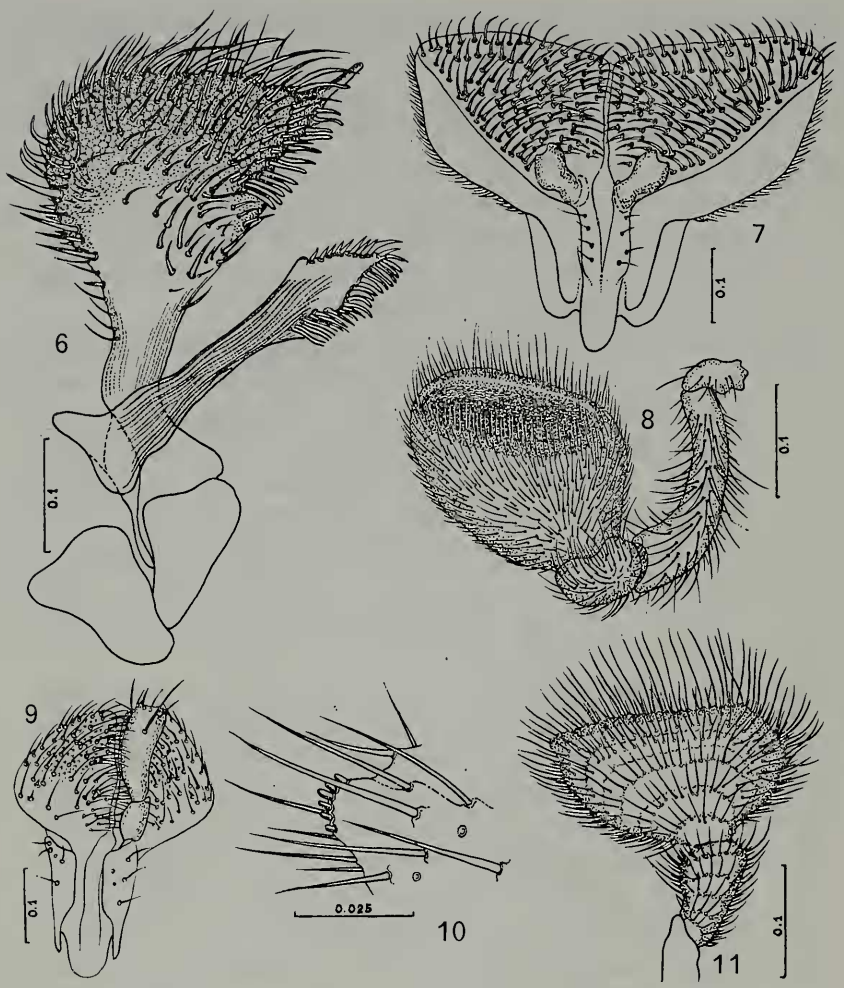

Fig. 6-11 - *Boatia albertae*, ♂ holotype: 6. left maxilla, dorsal side; 7. paraglossae, dorsal side; 8. left maxillary palpus, dorsally; 9. paraglosse of *Mordella aculeata* L. for comparison with fig. 7; 10. inner angle of 3rd article of labial palpus; 11. right labial palpus, dorsally.

Description. (2) Dimensions: head 1.35 x 2.0 mm; pronotum 1.7 x 2.4; elytra 2.3 x 3.3; total length 5.35; pygidium 0.85 x 0.65.

(2) I will omit description of those morphological aspects which are enough evident in the figures hereof.

Ratio max. length: max. width 2.22; ratio max. thickness: max. length 2.81.

General form as in plate I. Ground colour black with strong irideous shines, frons testaceous, buccal parts yellow with tip of mandibles darker; antennae reddish, distally darkened; gula and genae, all sternal part of thorax, abdomen and the whole pygidium and hypopygium reddish yellow; metepisterna and upper lateral sides of meso- and metasternum black. Dorsal pubescence as in plate I; lateral and sternal sides with sparse, dark coloured hairs. Head much broader than long (as 1.48); temporal fringe small, short; temporal edge obsolete; surface covered by small round points with very finely shagreened interstices; eyes suboval, exceptionally broad, occupying 3 fifths of total cranial surface, completely reaching occiput. Labial palps, maxilla, maxillary palps and paraglossae as in fig. 11-12, 6, 7 and 8, respectively; mandibles bidentate, very flat, dorsally somewhat concave; labrum narrow, small; clypeus flat, unusually broad (its width is 2.6 times that of labrum). Antennae as in fig. 12. Pronotum 1.41 times broader than long; sculpture consisting of deep, densely arranged, suboval points, with interstices very finely shagreened; marginal edge of the front side very strongly dilated in its anterior trait, obsolete at vertex of anterior angles; these, seen laterally, obtuse (110°), sharp; sides in lateral view moderately convex; basal angles obtuse (95°) slightly rounded off at vertex. Scutellum as in fig. 16. Elytra 1.43 times as long as their combined width at shoulders (plate I); their sculpture is not of the usual file-like pattern, but consists of deep, large, suboval regularly arranged points with interstices transversely and feebly shagreened. Meso- and metathorax as in fig. 1-2. Metasternal plates with densely arranged, deep, round points with no shagreen in interstices. Urosternal sculpture consisting of small, little impressed round points, with glossy interstices; at pleural sides of each urosternum such sculpture is obsolete. Ratio of urosterna: 8:6:5:5:13. Pygidium 1.76 times as long as hypopygium, flat, straight, triangular, its lateral grooves thin and not impressed; hypopygium rounded at tip. Paramera as in fig. 17-20, well in agreement (in their general layout) to those of *Tomoxia* (type C, FRANCISCOLO 1957: 225), phallobase and its tubular process of the usual type met with in most Mordellidae (excluding Stenaliini and Ctenidiinae), fig. 17-18,21; 8th and 9th invaginated urosterna as in fig. 22-23; penis (fig. 24-25), with a quite unique structure: a) the apex strongly bent inwards, b) a preapical hook, c) robust and rigid setae in the apical part directed backwards

(fig. 26). Anterior legs (fig. 3-4,14) building a sort of collecting device; middle tibiae shorter than middle tarsi (as 16:17); middle tarsi linear, like the anterior ones, with articles 1-5 of decreasing width, the 4th straightly cut distally; hind legs as in fig. 13; hind tibial spurs (same fig.) unequal, the inner one 1.75 times long as the outer one; all claws meeting the pattern of fig. 15. Tarsal rations: front 10:11:4:8:11; middle 16:7:5:3:4; hind 13:11:8:6.

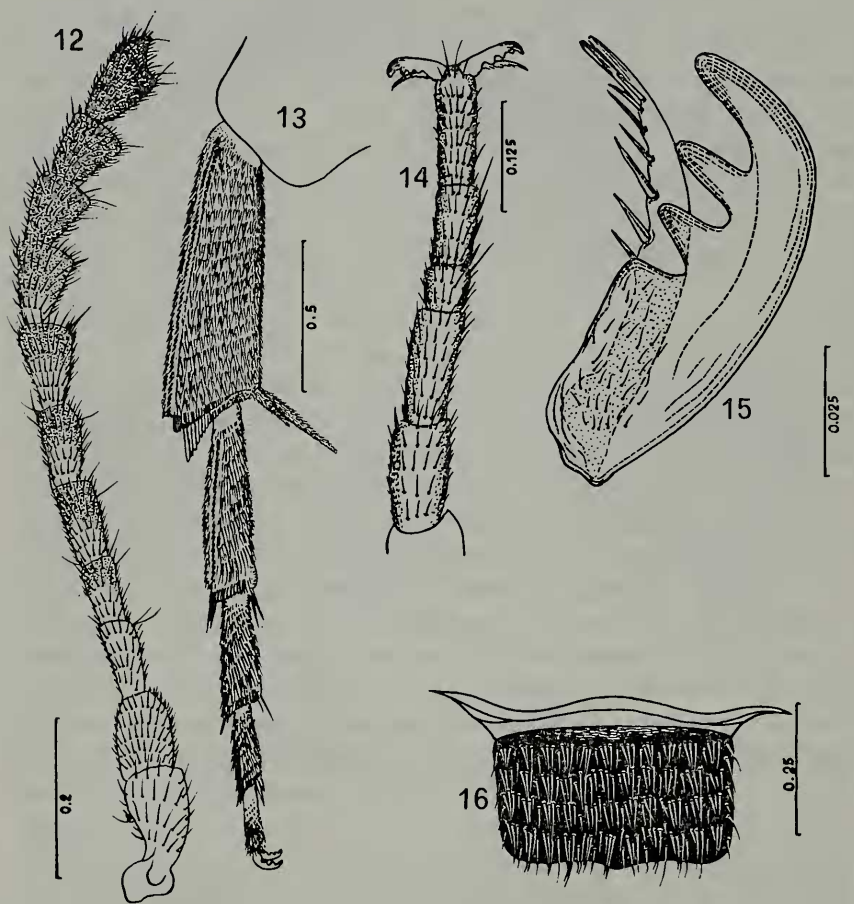

Fig. 12-16 - *Boatia albertae*, ♂ holotype: 12. left antenna, dorsally; 13. hind right tibia and tarsus, laterally from right; 14. protarsus, dorsally; 15. right inner claw of anterior pretarsus with its basipulvillus; 16. scutellum, pronotum removed.

Derivatio nominis. Genus and species are dedicated to my friend Dr. Alberta Boato, malacologist, Animal Biology Dept., University of Padova.

Bionomics. G. Onore (i.l. 21.9.1982) informed that in the collecting site, where bulldozers were clearing the forest for oil palm plantations, the tallest trees (40-50 m) were mainly belonging to the genera *Inga* Scop. (Leguminosae-Mimosaceae), *Virola* Aubl. (= *Myristica* L., Myristicaceae), *Cordia* L. (Boraginaceae), *Tabebuia* Gomez (Bignoniaceae), *Schizolobium* Vog. (Leguminosae) and *Brosimum* Sw. (Moraceae-Brosimeae); crowns were rapidly beaten immediately after felling before another big tree was going to be felled down. There are hence good reasons to think that *Boatia* is a canopy dweller.

According to Richards 1964 the presence of *Inga* indicates a young varzea successional stage (p. 286), with *Cordia* (p. 398) as typical secondary forest indicator of a primary association undisturbed since at least 15 years, whereas the presence of *Tabebuia* (p. 32, fig. 7), a tree typical of undisturbed primary association, indicates that the area was subject to moderate clearing only by primitive agriculture; Berg (1972: 161) considers *Brosimum* as prevailing in campos cerrados, within primary rain forest ([3]). These information indicate that the area which was unfortunately being cleared was covered by a moderately disturbed sub-montane primary rain forest (elevation is around 1000 m.a.s.).

The proctodeal vessel of the unique specimen was full with teleutospores of Uredinales (fig. 5), Protobasidiomycetes (Ferraris 1915: 578 fig. 121), indicating that *Boatia* is organized for scraping moulds growing on canopy decaying leaves, which apparently are its main food; teleutospores are likely to be evacuated without being digested.

Some morphofunctional aspects indicating a sort of specialization to feed upon such a type of pabulum are worth of some attention.

Discussion. I don't consider the strongly arcuate profemora and protibiae (equipped with rows or robust and short spines at their

([3]) The area, according to Imbelloni in Biasutti 1957: 528, 529 (map fig. 393) and 638 (map fig. 478), is (or was) occupied by Barbacoas of the Cibcia language family, known to practise, as most rain forest S.A. Indians, shifting methods of primitive agriculture: only the very tall and big trees, such as *Tabebuia*, are left in place in the small clearings, which, after a few years, are newly invaded by secondary growth in the sequences described by Richards 1964: 397-403 which lead to a return to primary forest climax.

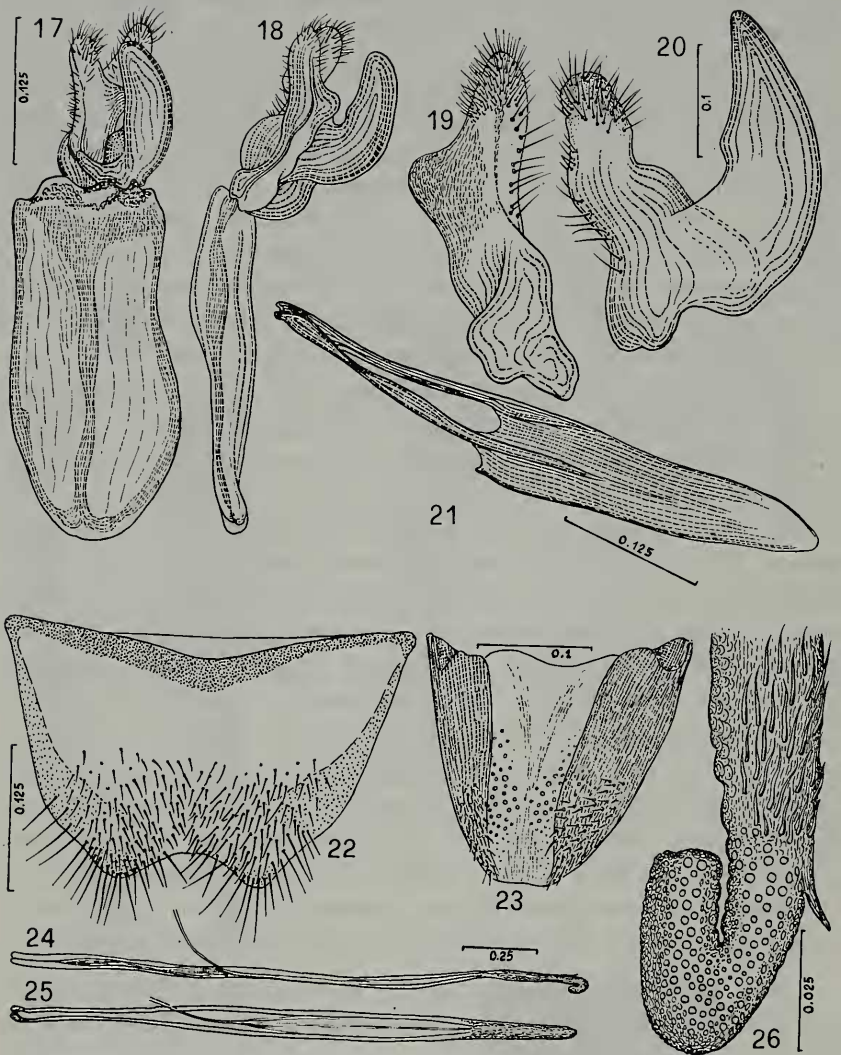

Fig. 17-26 - *Boatia albertae*, ♂ holotype: 17.18: phallobase and paramera, attached, from above and from left; 19. left parameron ventrally; 20. right parameron, ventrally; 21. tubular process of phallobase; 22. 8th introflected urosternon, ventrally; 23. 9th introflected urosternon, ventrally; 24.25. penis, left side and dorsal side; 26. same, apex, laterally, dorsal side at right.

inner side) as a sexually dimorphic character as known to occur in males only of a few Mordellidae: the general organization of *Boatia* is so similar to that of *Cothurus*, whose female has profemora and protibiae similarly arcuate like in males (as verified on syntypes of both sexes, FRANCISCOLO in press), that it suggests that such a structure is present in females too (4) and used as a collecting device to heap up moulds and rusts scraped from leaves; the scraping action on leaf surface is certainly exerted by the meso-metasternal keel, combined with the wide and concave area in the mesoepimeral-mesosternal zone to act as a mold-board whose cutting edge is the keel itself, particularly in its trait running between and behind the mesocoxae. Such a heaping device is well in agreement with the quite unusual buccal structures: the broad, laminar mandibles, the strongly spatulate galea (not so far observed in other Mordellidae), the shape of maxillary and labial palpi, the extraordinarily expanded, spoon-shaped paraglossae which build up a sort of broad shovel (for comparison, I show in fig. 9, at the same scale, the paraglossae of *Mordella aculeata* L. 1758); also the spiny productions at the inner (anterior) angle of galeae (fig. 6) and of distal article of labial palpi (fig. 10) suggest that they are mainly adapted for scraping on leaf surface.

Besides this unusual scraping and heaping apparatus, which is definitely apotypic as a whole (though more highly specialized than in *Cothurus*) in the ground plan of such a monophyletic group like Mordellidae, *Boatia* has other apotypic characters: the rectangular scutellum (FRANCISCOLO 1980: 195), the linear front and middle tarsi, the galeae shorter than head, the finely faceted, not emarginate and not hypocranially expanded eyes, the asymmetric paramera and the hooked, bent and spiny penis. The flat, short, stout pygidium, the pubescent eyes and the general anaspoid facies are imputable to convergence, since they appear almost at random in many other genera, including Conaliini,

(4) It might appear not to be recommendable to describe a new genus on a single ♂; however I am strongly in doubt that other specimens become available if the environment where the insect lives has been entirely destroied since writing. On the other hand the rarity of canopy dwellers in conventional collections (if special methods are not used as described by T.L. Erwin, i.e. tree fogging, and by S. Sutton, i.e. walkways and climbing techniques, at the Tropical Rain Forest Ecology and Resource Management Symposium, Leeds, April 1982, HOLLOWAY 1982: 264-266) is well known; for instance, *Cothurus iridescens* Champ. 1891 is still known only for the type series (5 specimens, 4 now present in B.M.(N.H.)) after 93 years from its description.

apparently without any direct morphofunctional connection with the variance of other characters and not diverging significantly from the ground plan of the family.

Yakuhananomia fulviceps (Champion 1891: 262) **comb. nov.**

Tomoxia fulviceps Champion l.c., t. 11, f. 9.
Tomoxia fulviceps Csiki 1915: 5.

Material examined: 1 ♀, beaten on crown of a very tall tree immediately after felling by bulldozers, in moist evergreen forest at 1000 m.a.s. in Rio Coca region near Puerto Orellana, north of Rio Napo, Prov. de Napo, Ecuador, South America, January 1982, leg. G. Onore (MSNG, Genova).

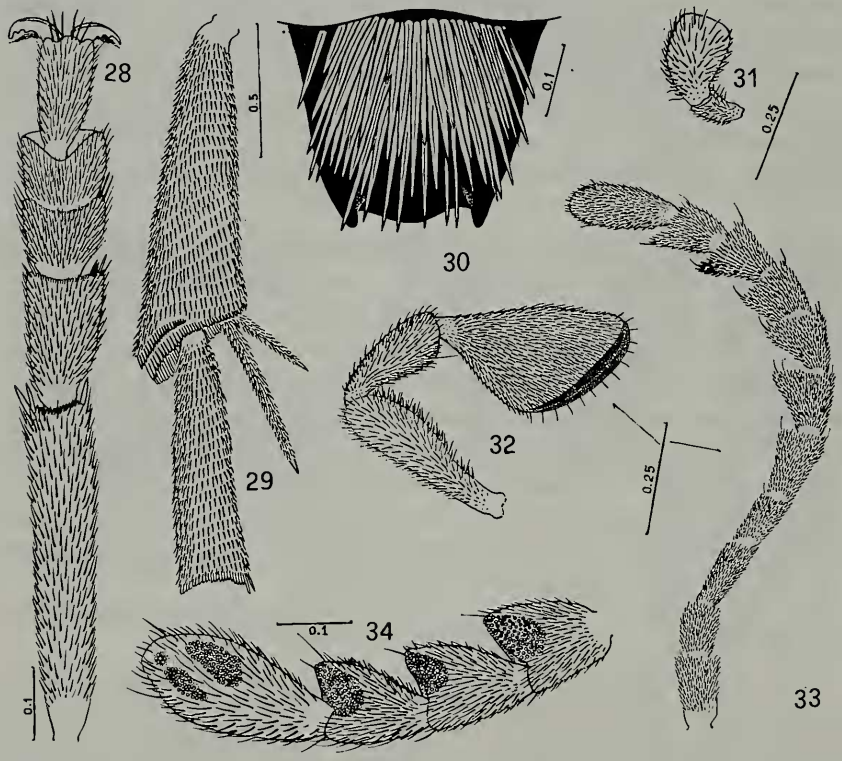

Fig. 28-34 - *Yakuhananomia fulviceps* (Champion) ♀ (Rio Coca): 28. protarsus, dorsally; 29. hind tibia and basitarsus, outer side from right; 30. scutellum; 31. labial palpus (last 2 articles); 32. maxillary palpus (last 3 articles); 33. right antenna, from above; 34. last 4 articles of same, ventrally, to show the papillate areas.

Pending the revision of *Yakuhananomia* KÔNO 1935: 124, I think it is important to move *fulviceps* from *Tomoxia* into Kôno's genus; the specimen in question was taken in the same circumstances as described for *Boatia albertae*; it is a tribute to G.C. CHAMPION's work if the identification was possible with his careful description and with his colour figure. The species is so far known only upon the three typical specimens, all ♂♂ (as Champion says), in B.M. (N.H.), from Mexico and Nicaragua; the female remained undescribed to date. In fig. 28-34 I give enough visual information about relevant characters (front tarsus, hind tibia and basitarsus, scutellum, labial and maxillary palpus, antenna and the unusual papillate areas of articles 8-11). By the form of the scutellum with the characteristic hooks at the posterior angles it meets rather closely the pattern of *Yakuhananomia bidentata* (SAY 1824: 277). So far the species of *Yakuhananomia* have the following distribution: *bidentata* (Say) (widely spread in the United States), *fulviceps* (Champ.) (Mexico, Nicaragua, Ecuador), *yakui* Kôno (Japan), *polyspila* (Fairm.) (Western Congo, Gabon, Camerun, Islands of Sao Thomé, Principe, Fernando Poo), *ermischi* Franciscolo (Sao Thomé). The genus appears to be quite uniform in spite of its very wide and scattered distribution. I refrain at this stage of the study from giving an identification key to its species.

Acknowledgements. I am indebted to Dr. Giuseppina Barberis, Botanical Gardens and Institute, University of Genova, for having checked for me the status of the trees mentioned in this note, and to Dr. Roberto Poggi, Curator, Museo Civico di Storia Naturale, Genova, for having reviewed the manuscript.

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RIASSUNTO

Si descrive il nuovo genere *Boatia* che presenta strutture del torace, degli arti protoracici e dell'apparato boccale piuttosto insolite nel piano organizzativo di base noto per i Mordellidi; visti i tipi di *Cothurus iridescens* Champion, risulta che tale Mordellide presenta strutture simili (già ben messe in evidenza sin dal 1891 da G.C. Champion, ignorato però su tal punto da tutti gli AA. successivi). In relazione alle circostanze di cattura (falciando la chioma di un grosso albero appena abbattuto, in foresta pluviale relativamente indisturbata da almeno 15 anni, in Ecuador, regione del Rio Coca presso Puerto Orellana) e al contenuto del proctodeo, ripieno di teleutospore di Uredinales, è chiaro che le strutture suddette, assai apotipiche, sono morfofunzionalmente atte alla raschiatura, accumulo e ingestione delle parti emergenti di ruggini e muffe su foglie delle chiome. *Boatia* è considerabile quindi un insetto tipico della zona di chioma in foresta pluviale. *Boatia* e *Cothurus* vanno l'uno posto e l'altro spostato al termine della chiave analitica dei generi di Mordellidi del mondo. Con *Boatia* (nelle stesse circostanze) fu raccolta 1 ♀ di *Yakuhananomia fulviceps* (Champion) comb. nov., olim *Tomoxia* Costa; genere e specie son nuovi per l'Ecuador.

SUMMARY

Boatia, n.g., has the structures of thorax, front legs and buccal parts rather unusual within the ground plan of Mordellids; examination of types has shown that *Cothurus iridescens* Champion shares similar structures (as noted since 1891 by G.C. Champion,

who was ignored, in this particular case, by all subsequent Authors). In view of the collecting circumstances (beating crowns of a big tree as soon as felled, in a rain forest left relatively undisturbed since 15 years at least, in Ecuador, Rio Coca Region, near Puerto Orellana) and the proctodeal vessel being full of teleutospores of Uredinales, it is clear that such highly apotypic structures are morphofunctionally apt to scrape, heap up and ingest emergent parts of leaf rusts and molds of canopy leaves. *Boatia* is considered a typical canopy dweller. With *Cothurus* it has to be placed at the end of the key to world genera of Mordellids. One ♀ of *Yakuhananomia fulviceps* (Champion) comb. nov. (moved herewith from *Tomoxia* Costa) was collected in the same locality and circumstances with *Boatia*; the genus and the species are recorded from Ecuador for the first time.